

M.Sc. Agriculture (Agronomy) Second Year (3<sup>rd</sup> and 4<sup>th</sup> Semester) Session 2018-19, 2019-20

# MATA GUJRI COLLEGE

## FATEHGARH SAHIB

(AN AUTONOMOUS COLLEGE)

RE-ACCREDITED BY NAAC WITH “A” GRADE

“COLLEGE WITH POTENTIAL FOR EXCELLENCE” STATUS BY UGC”



### SYLLABI

SESSION: (2018-19, 2019-20)

FACULTY OF LIFE SCIENCE

DEPARTMENT OF AGRICULTURE

COURSE: MASTER OF SCIENCE AGRICULTURE

AGRONOMY

**Outline of the Major courses of Agronomy for Semester-III**  
**M.Sc. Agriculture (Agronomy)**  
**Semester-III**

Paper Code	Subject	Credit per week		Marks		External Assessment		Internal Assessment		Grand Total
		Theory	Practical	Theory	Practical	Theory	Practical	Theory	Practical	
AGRON-507	Agronomy of oilseed, fibre and sugar crops	3	1	75	25	45	25	30	00	100
AGRON-511	Cropping systems and sustainable Agriculture	3	0	100	00	70	00	30	00	100
SOILS 507	Soil erosion and conservation	3	1	75	25	45	25	30	00	100
AGRON-599	Master's research	0	10	00	100	00	100	00	00	100
<b>Total</b>		<b>09</b>	<b>12</b>	<b>250</b>	<b>150</b>	<b>160</b>	<b>150</b>	<b>90</b>	<b>00</b>	<b>400</b>

\*One credit hour of Practical= 2 hours

\*One credit hour of Theory= 1 hour

\*One credit hour of Master Research= 1 hour

## **AGRONOMY**

### **Semester-III**

#### **Course Contents**

#### **AGRON: 507 AGRONOMY OF OILSEED, FIBRE AND SUGAR CROPS**

**Time: 3 Hours**

**Periods per Week 3+1**

**Max. Marks: 100**

**Theory: 75**

**Theory Internal assessment: 30**

**Theory external assessment: 45**

**Practical: 25**

#### **INSTRUCTIONS FOR THE PAPER SETTERS /CANDIDATES**

The question paper will consist of three sections A, B and C. Section-A will have four questions from unit-I of the syllabus and section-B will have four questions from unit-II of the syllabus carrying 9 marks each. Student will have to attempt two questions from each section. Section - C will consist of 9 short answer type questions which will cover the entire syllabus uniformly and will carry 01 mark for each question. All questions of Section-C are compulsory.

#### **Objective**

To teach the crop husbandry of oilseed, fiber and sugar crops.

#### **Theory**

##### **UNIT-I**

Origin and history, area and production, classification, improved varieties, adaptability, climatic, soil, nutrient, water, cultural requirements, weed management, quality components, handling and processing of the produce for rapeseed and mustard, linseed, sesame, castor, soybean and cotton.

##### **UNIT-II**

Origin and history, area and production, classification, improved varieties, adaptability, climatic, soil, nutrient, water, cultural requirements, weed management, quality components, handling and processing of the produce for Jute, sunhemp, sugar-beet, sugarcane, safflower and sunflower.

#### **List of Practical's**

1. Planning and layout of field experiments
2. Cutting of sugarcane setts, its treatment and methods of sowing, tying and propping of sugarcane

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3. Determination of cane maturity and calculation on purity percentage, recovery percentage and sucrose content in cane juice
4. Intercultural operations in different crops
5. Cotton seed treatment
6. Monetary yield advantage and ATER of prominent intercropping systems.
7. Judging of physiological maturity in different crops and working out harvest index
8. Working out cost of cultivation of crop.
9. Determination of oil content in oilseeds and computation of oil yield
10. Study of seed production techniques in various crops
11. Visit to field experiments on cultural, fertilizer, weed control and water management aspects and prepared report.
12. Visit to nearby villages for identification of constraints in crop production

**Suggested Readings**

1. Das NR. 2007. *Introduction to Crops of India*. Scientific Publ.
2. Das PC. 1997. *Oilseed Crops of India*. Kalyani.
3. Lakshmikantam N. 1983. *Technology in Sugarcane Growing*. 2nd Ed. Oxford & IBH.
4. Prasad, Rajendra. 2002. *Text Book of Field Crop Production*. ICAR.
5. Singh C, Singh P & Singh R. 2003. *Modern Techniques of Raising Field Crops*. Oxford & IBH.
6. Singh SS. 1998. *Crop Management*. Kalyani.

**AGRON 511 CROPPING SYSTEMS AND SUSTAINABLE AGRICULTURE**

**Time: 3 Hours**

**Max. Marks: 100**

**Periods per Week 3+0**

**Theory Internal assessment: 30**

**Theory external assessment: 70**

**INSTRUCTIONS FOR THE PAPER SETTERS/CANDIDATES**

The question paper will consist of three sections A, B and C. Section-A will have four questions from unit-I of the syllabus and section-B will have four questions from unit-II of the syllabus carrying 14 marks each. Student will have to attempt two questions from each section. Section - C will consist of 14 short answer type questions which will cover the entire syllabus uniformly and will carry 01 mark for each question. All questions of Section-C are compulsory.

**Objective**

To acquaint the students about prevailing cropping systems in the country and practices to improve their productivity.

**Theory**

**UNIT-I**

Cropping systems: definition, indices and its importance; physical resources, soil and water management in cropping systems; assessment of land use and cropping system. Concept of sustainability in cropping systems and farming systems, scope and objectives; production potential under monoculture cropping, multiple cropping, alley cropping, sequential cropping and intercropping, mechanism of yield advantage in intercropping systems. Above and below ground interactions and allelopathic effects.

**UNIT-II**

Competition relations; multi-storied cropping and yield stability in intercropping, role of non-monetary inputs and low cost technologies; research need on sustainable agriculture, Crop diversification for sustainability; role of organic matter in maintenance of soil fertility; crop residue management; fertilizer use efficiency and concept of fertilizer use in intensive cropping system, Plant ideotypes for dry lands; plant growth regulators and their role in sustainability. Sustainable agriculture, conservation agriculture.

**Suggested Readings**

1. Palaniappan SP & Sivaraman K. 1996. *Cropping Systems in the Tropics; Principles and Management*. New Age.

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2. Panda SC. 2003. *Cropping and Farming Systems*. Agrobios.
3. Reddy SR. 2000. *Principles of Crop Production*. Kalyani.
4. Sankaran S & Mudaliar TVS. 1997. *Principles of Agronomy*. The Bangalore Printing & Publ.
5. Singh SS. 2006. *Principles and Practices of Agronomy*. Kalyani.
6. Tisdale SL, Nelson WL, Beaton JD & Havlin JL. 1997. *Soil Fertility and Fertilizers*. Prentice Hall.

**SOILS 507 Soil Erosion and Conservation**

**Time: 3 Hours**

**Periods per Week 3+1**

**Max. Marks: 100**

**Theory: 75**

**Theory Internal assessment: 30**

**Theory external assessment: 45**

**Practical: 25**

**INSTRUCTIONS FOR THE PAPER SETTERS /CANDIDATES**

The question paper will consist of three sections A, B and C. Section-A will have four questions from unit-I of the syllabus and section-B will have four questions from unit-II of the syllabus carrying 9 marks each. Student will have to attempt two questions from each section. Section - C will consist of 9 short answer type questions which will cover the entire syllabus uniformly and will carry 01 mark for each question. All questions of Section-C are compulsory.

**Objective**

To enable students to understand various types of soil erosion and measures to be taken for controlling soil erosion to conserve soil and water

**Theory**

**UNIT I**

History, distribution, identification and description of soil erosion problems in India. Forms of soil erosion; effects of soil erosion and factors affecting soil erosion; types and mechanisms of water erosion; raindrops and soil erosion; rainfall erosivity - estimation as EI30 index and kinetic energy; factors affecting water erosion; empirical and quantitative estimation of water erosion; methods of measurement and prediction of runoff; soil losses in relation to soil properties and precipitation.

**UNIT II**

Wind erosion- types, mechanism and factors affecting wind erosion; extent of problem in the country; principles of erosion control; erosion control measures – agronomical and engineering; erosion control structures - their design and layout. Soil conservation planning; soil conservation in special problem areas such as hilly, arid and semi-arid regions, waterlogged and wet lands. Watershed management - concept, objectives and approach; water harvesting and recycling; flood control in watershed management; socioeconomic aspects of watershed management.

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**Practical**

1. Determination of different soil erodibility indices - suspension percentage, dispersion ratio, erosion ratio, clay ratio, clay/moisture equivalent ratio, percolation ratio, raindrop erodibility index.
2. Computation of kinetic energy of falling rain drops Computation of rainfall erosivity index (EI<sub>30</sub>) using rain gauge data.
3. Visits to a watersheds.

**Suggested Readings**

1. Biswas T.D & Narayanasamy G. (Eds.) 1996. *Soil Management in Relation to Land Degradation and Environment*. Bull. Indian Society of Soil Science No. 17.
2. Doran J.W & Jones A.J. 1996. *Methods of Assessing Soil Quality*. Soil Science Society of America, Spl Publ. No. 49, Madison, USA.
3. Gurmil Singh, Venkataramanan C, Sastry G & Joshi B.P. 1990. *Manual of Soil and Water Conservation Practices*. Oxford & IBH. Hudson N. 1995. *Soil Conservation*. Iowa State Univ.Press.
4. Indian Society of Soil Science 2002. *Fundamentals of Soil Science*. ISSS, New Delhi.
5. Oswal M.C. 1994. *Soil Physics*. Oxford & IBH.



## Outline of the Major courses of Agronomy for Semester-IV

M.Sc. Agriculture (Agronomy)

### Semester-IV

Paper Code	Subject	Credit per week		Marks		External Assessment		Internal Assessment		Grand Total
		Theory	Practical	Theory	Practical	Theory	Practical	Theory	Practical	
AGRON-513	Principles and practices of organic farming	3	1	75	25	45	25	30	00	100
AGRON-512	Dryland farming and watershed management	3	1	75	25	45	25	30	00	100
AGRON-591	Master's seminar	1	0	100	00	00	00	100	00	100
AGRON-599	Master's research	0	10	00	100	00	100	00	00	100
<b>Total</b>		<b>7</b>	<b>12</b>	<b>250</b>	<b>150</b>	<b>90</b>	<b>150</b>	<b>160</b>	<b>00</b>	<b>400</b>

\*One credit hour of Practical= 2 hours

\*One credit hour of Theory= 1 hour

\*One credit hour of Master Research= 1 hour

**SEMESTER- IV**

**AGRON- 513 PRINCIPLES AND PRACTICES OF ORGANIC FARMING**

**Time: 3 Hours**

**Max. Marks: 100**

**Periods per Week 3+1**

**Theory: 75**

**Theory Internal assessment: 30**

**Theory external assessment: 45**

**Practical: 25**

**INSTRUCTIONS FOR THE PAPER SETTERS /CANDIDATES**

The question paper will consist of three sections A, B and C. Section-A will have four questions from unit-I of the syllabus and section-B will have four questions from unit-II of the syllabus carrying 9 marks each. Student will have to attempt two questions from each section. Section - C will consist of 9 short answer type questions which will cover the entire syllabus uniformly and will carry 01 mark for each question. All questions of Section-C are compulsory.

**Objective**

To study the principles and practices of organic farming for sustainable crop production.

**Theory**

**UNIT-I**

Organic farming - concept and definition, its relevance to India and global agriculture and future prospects; land and water management - land use, minimum tillage; shelter zones, hedges, pasture management, agro-forestry. Organic farming and water use efficiency; soil fertility, nutrient recycling, organic residues, organic manures, composting, soil biota and decomposition of organic residues, earthworms and vermicompost, green manures and biofertilizers.

**UNIT-II**

Crop residue management. Farming systems, crop rotations, multiple and relay cropping systems, intercropping in relation to maintenance of soil productivity. Control of weeds, diseases and insect pests in organic farming, biological agents and pheromones, biopesticides. Socio-economic impacts; marketing and export potential: inspection, certification, labeling and accreditation procedures; organic farming and national economy.

**List of Practical's**

1. Aerobic and anaerobic methods of making compost
2. Making of vermicompost
3. Identification and nursery raising of important agro-forestry trees and trees for shelter belts

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4. Efficient use of biofertilizers, technique of treating legume seed treatment with *Rhizobium* cultures,
5. Use of *Azotobacter*, *Azospirillum*, and PSB cultures in field
6. Visit to an organic farm and prepared report.
7. Decomposition of organic residue.
8. Quality standards, inspection, certification and labeling and accreditation procedures for farm produce from organic farms

**Suggested Readings**

1. Ananthkrishnan TN. (Ed.). 1992. *Emerging Trends in Biological Control of Phytophagous Insects*. Oxford & IBH.
2. Gaur AC. 1982. *A Manual of Rural Composting*, FAO/UNDP Regional Project Document, FAO.
3. Lampin N. 1990. *Organic Farming*. Press Books, Ipswich, UK.
4. Palaniappan SP & Anandurai K. 1999. *Organic Farming – Theory and Practice*. Scientific Publ.
5. Rao BV Venkata. 1995. *Small Farmer Focused Integrated Rural Development: Socioeconomic Environment and Legal Perspective*: Publ. 3, Parisaraprajna Parishtana, Bangalore.
7. Reddy MV. (Ed.). 1995. *Soil Organisms and Litter Decomposition in the Tropics*. Oxford & IBH.
8. Sharma A. 2002. *Hand Book of Organic Farming*. Agrobios.
9. Singh SP. (Ed.) 1994. *Technology for Production of Natural Enemies*. PDBC, Bangalore.
10. Subba Rao NS. 2002. *Soil Microbiology*. Oxford & IBH.
11. Trivedi RN. 1993. *A Text Book of Environmental Sciences*, Anmol Publ.
12. Veeresh GK, Shivashankar K & Suiglachar MA. 1997. *Organic Farming and Sustainable Agriculture*. Association for Promotion of Organic Farming, Bangalore.
14. WHO. 1990. *Public Health Impact of Pesticides Used in Agriculture*. WHO.

**AGRON- 512 DRYLAND FARMING AND WATERSHED MANAGEMENT**

**Time: 3 Hours**

**Max. Marks: 100**

**Periods per Week 3+1**

**Theory: 75**

**Theory Internal assessment: 30**

**Theory external assessment: 45**

**Practical: 25**

**INSTRUCTIONS FOR THE PAPER SETTERS /CANDIDATES**

The question paper will consist of three sections A, B and C. Section-A will have four questions from unit-I of the syllabus and section-B will have four questions from unit-II of the syllabus carrying 9 marks each. Student will have to attempt two questions from each section. Section - C will consist of 9 short answer type questions which will cover the entire syllabus uniformly and will carry 01 mark for each question. All questions of Section-C are compulsory.

**Objective**

To teach the basic concepts and practices of dry land farming and soil moisture conservation.

**Theory**

**UNIT-I**

Definition, concept and characteristics of dryland farming; dryland versus rainfed farming; significance and dimensions of dryland farming in Indian agriculture. Soil and climatic parameters with special emphasis on rainfall characteristics; constraints limiting crop production in dryland areas; types of drought, characterization of environment for water availability; crop planning for erratic and aberrant weather conditions. Stress physiology and resistance to drought, adaptation of crop plants to drought, drought management strategies; preparation of appropriate crop plans for dryland areas; mid contingent plan for aberrant weather conditions.

**UNIT-II**

Tillage, tith, frequency and depth of cultivation, compaction in soil tillage; concept of conservation tillage; tillage in relation to weed control and moisture conservation; techniques and practices of soil moisture conservation (use of mulches, kinds, effectiveness and economics); antitranspirants; soil and crop management techniques, seeding and efficient fertilizer use. Concept of watershed resource management, problems, approach and components.

**List of Practical's**

1. Seed treatment, seed germination and crop establishment in relation to soil moisture contents
2. Moisture stress effects and recovery behaviour of important crops
3. Estimation of moisture index and aridity index
4. Spray of anti-transpirants and their effect on crops
5. Collection and interpretation of data for water balance equations
6. Water use efficiency
7. Preparation of crop plans for different drought conditions
8. Study of field experiments relevant to dryland farming
9. Visit to dryland research stations and watershed projects

**Suggested Readings**

1. Das NR. 2007. *Tillage and Crop Production*. Scientific Publ.
2. Dhopte AM. 2002. *Agrotechnology for Dryland Farming*. Scientific Publ.
3. Dhruv Narayan VV. 2002. *Soil and Water Conservation Research in India*. ICAR.
4. Gupta US. (Ed.). 1995. *Production and Improvements of Crops for Drylands*. Oxford & IBH.
5. Katyal JC & Farrington J. 1995. *Research for Rainfed Farming*. CRIDA.
6. Rao SC & Ryan J. 2007. *Challenges and Strategies of Dryland Agriculture*. Scientific Publ.
7. Singh P & Maliwal PL. 2005. *Technologies for Food Security and Sustainable Agriculture*. Agrotech Publ. Company.
8. Singh RP. 1988. *Improved Agronomic Practices for Dryland Crops*. CRIDA.
9. Singh RP. 2005. *Sustainable Development of Dryland Agriculture in India*. Scientific Publ.
10. Singh SD. 1998. *Arid Land Irrigation and Ecological Management*. Scientific Publ.
11. Venkatesh warlu J. 2004. *Rainfed Agriculture in India. Research and Development Scenario*. ICAR.